In Situ Chemical Reduction of TCE using Multiple Electron Donors in Low Permeability Subsurface Soils

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INTRODUCTION

Site Location
Mountain View, CA

Chemical of Concern
Trichloroethene (TCE)

Issue
The Site TCE plume commingled with a regional Superfund TCE plume.

SITE BACKGROUND

Geology
2 to 3 feet (ft) thick sand units iner-bedded with silts and clays between 5 and 20 ft below ground surface (bgs)

Depth to Water
4 to 5 ft bgs

Groundwater Concentrations
50 to 400 micrograms per liter

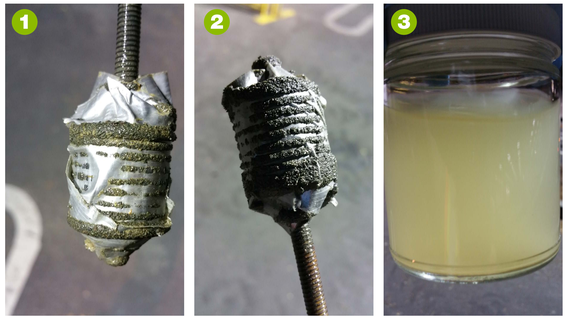
REMEDIATION STRATEGY

- ISCR application of 39,560 lbs of ELS, 19,624 lbs of sodium lactate, 136,000 lbs of ZVI, 920 lbs of Accelerite, and 179 liters of SDC-9.
- Four injection intervals in 2-foot intervals between 7 and 18 ft bgs in 118 borings.

PNEUMATIC INJECTION EQUIPMENT SET UP

A Conditioned Water Storage Tank
B ELS, ZVI, SDC-9, Accelerite, and Sodium Lactate Mixing Tank
C Control Panel
D ZVI Hopper
E Nitrogen Tanks
F Nitrogen Gas Pressure Regulator

DISTRIBUTION OF ELS + ZVI



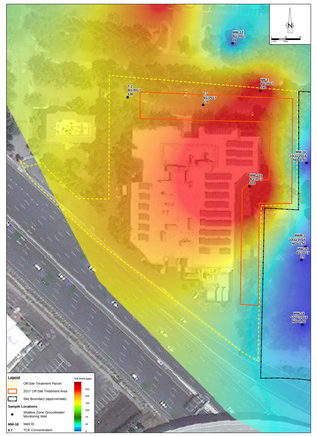
Site Map

1. A magnet was lowered down a well 10.5 feet outside the treatment area to capture ZVI.
2. A magnet was lowered down a well within the treatment area.
3. Water samples were collected from a monitoring wells showing both ELS distribution from adjacent injection points.

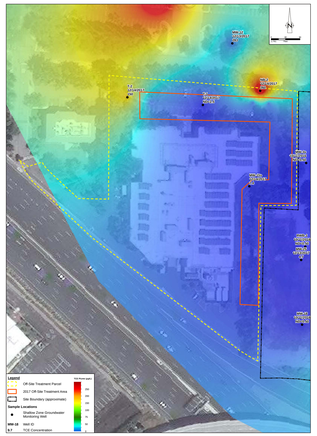
SITE MAP

TCE DISTRIBUTION IN SHALLOW GROUNDWATER

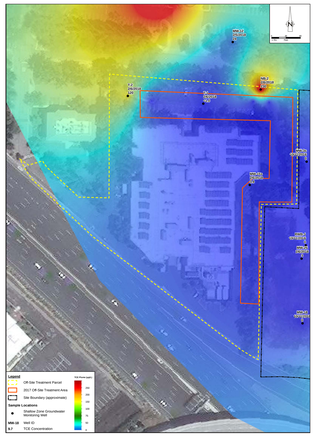
Pre-Injection



December 2017



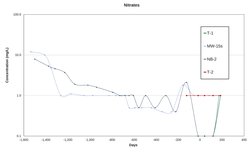
February 2018

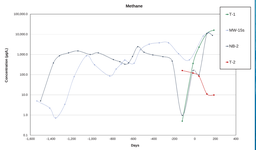


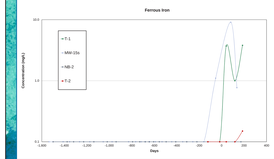
Sources: Imagery - © TerraServer, DigitalGlobe, 2015 (image captured June 21st, 2015). Streets - U.S. Department of Commerce, U.S. Census Bureau, Geography Divisi, 2010, TIGER/Line 2010 Census, Census Tract national-based.
Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

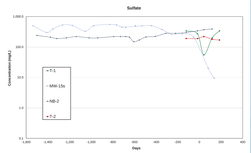
NOTES:
1. ND=0.50 = not detected at or above reporting limits
2. Concentrations presented in micrograms per liter (µg/L)
3. TCE = Trichloroethene
4. ND=0.50 / ND=0.50 at location MW-19 indicates a duplicate sample was taken.

RESULTS









OBSERVATIONS

- Approximately 99% of TCE degradation within the targeted treatment zone following the ELS+lactate+ZVI injection
- Water samples and a magnet down well showed effective distribution of ELS+lactate+ZVI with a radius of influence of 10.5 feet.
- Moderate sulfate reduction and elevated methanogenesis following ELS+lactate+ZVI injection

CONCLUSIONS

ELS+lactate+ZVI were effective as ISCR treatment of TCE within the targeted treatment zone.

Acknowledgements
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